

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A liquid crystal display device, comprising:
a first substrate, a second substrate, and a liquid crystal layer provided between the first substrate and the second substrate;
the liquid crystal display device having a plurality of picture element regions;
wherein:
the first substrate includes a picture element electrode provided on the side of the liquid crystal layer, the picture element electrode being provided in each of the plurality of picture element regions, and switching devices electrically connected to the picture element electrodes;
the second substrate includes a counter electrode opposing the picture element electrodes with the liquid crystal layer interposed therebetween; and
in each of a plurality of the picture element regions, the picture element electrode includes a solid area including a plurality of unit solid areas; and the liquid crystal layer is in a vertical alignment when no voltage is applied between the picture element electrode and the counter electrode, and when a voltage is applied between the picture element electrode and the counter electrode, forms a liquid crystal domain taking a radially-inclined orientation in a region corresponding to each of the plurality of unit solid areas by an oblique electric field produced in the vicinity of each of the plurality of unit solid areas of the picture element electrode;
the liquid crystal display device further comprising, in each of the plurality of picture element regions, a storage capacitance connected electrically in parallel to a liquid crystal

capacitance which includes the picture element electrode, the counter electrode, and the liquid crystal layer; wherein:

in each of the plurality of picture element regions, the first substrate has an area where no solid area of the picture element electrode is provided; and

at least a part of the storage capacitance is located in the area of the first substrate where no solid area is provided, and wherein a storage capacitor line extends in a direction such that a central elongated portion corresponding to a central portion of at least part of the storage capacitor line is aligned in the area where no solid area is provided so that the central elongated portion of the storage capacitor line is not aligned to overlap with any significant parts of the unit solid ~~portions~~ areas.

2. (Original) The liquid crystal display device of claim 1, wherein the switching device is a thin film transistor.

3. (Original) The liquid crystal display device of claim 2, wherein the storage capacitance includes a storage capacitance line, a storage electrode opposing the storage capacitance line and electrically connected to a drain electrode of the thin film transistor, and a first insulating layer provided between the storage capacitance line and the storage electrode.

4. (Original) The liquid crystal display device of claim 3, wherein at least a part of the storage capacitance line, at least a part of the storage electrode, and at least a part of the first insulating layer are located in the area.

5. (Previously presented) The liquid crystal display device of claim 3, wherein the first substrate includes a scanning line electrically connected to a gate electrode of the thin film transistor and a signal line electrically connected to a source electrode of the thin film transistor.

6. (Previously presented) A liquid crystal display device, comprising:
a first substrate, a second substrate, and a liquid crystal layer provided between the first substrate and the second substrate;

the liquid crystal display device having a plurality of picture element regions;

wherein:

the first substrate includes a picture element electrode provided on the side of the liquid crystal layer, the picture element electrode being provided in each of the plurality of picture element regions, and switching devices electrically connected to the picture element electrodes;

the second substrate includes a counter electrode opposing the picture element electrodes with the liquid crystal layer interposed therebetween;

in each of a plurality of the picture element regions, the picture element electrode includes a solid area including a plurality of unit solid areas; and the liquid crystal layer is in a vertical alignment when no voltage is applied between the picture element electrode and the counter electrode, and when a voltage is applied between the picture element electrode and the counter electrode, forms a liquid crystal domain taking a radially-inclined orientation in a region corresponding to each of the plurality of unit solid areas by an oblique electric field produced in the vicinity of each of the plurality of unit solid areas of the picture element electrode;

the liquid crystal display device further comprising, in each of the plurality of picture element regions, a storage capacitance connected electrically in parallel to a liquid crystal

capacitance which includes the picture element electrode, the counter electrode, and the liquid crystal layer; wherein:

in each of the plurality of picture element regions, the first substrate has an area where no solid area of the picture element electrode is provided;

at least a part of the storage capacitance is located in the area of the first substrate where no solid area is provided;

wherein the switching device is a thin film transistor;

wherein the storage capacitance includes a storage capacitance line, a storage electrode opposing the storage capacitance line and electrically connected to a drain electrode of the thin film transistor, and a first insulating layer provided between the storage capacitance line and the storage electrode;

wherein the first substrate includes a scanning line electrically connected to a gate electrode of the thin film transistor and a signal line electrically connected to a source electrode of the thin film transistor;

the storage capacitance line includes at least one line stem extending generally parallel to the scanning line and a line branch branched from the at least one line stem; and

the storage electrode includes at least one electrode stem opposing the at least one line stem with the first insulating layer interposed therebetween and an electrode branch branched from the at least one electrode stem.

7. (Original) The liquid crystal display device of claim 6, wherein the line branch and the electrode branch are branched so as to overlap a central portion of one of the plurality of unit solid areas or the vicinity thereof.

8. (Previously presented) The liquid crystal display device of claim 6, wherein the at least one line stem is a plurality of line stems, and the at least one electrode stem is a plurality of electrode stems.

9. (Previously presented) A liquid crystal display device, comprising:
a first substrate, a second substrate, and a liquid crystal layer provided between the first substrate and the second substrate;
the liquid crystal display device having a plurality of picture element regions;
wherein:
the first substrate includes a picture element electrode provided on the side of the liquid crystal layer, the picture element electrode being provided in each of the plurality of picture element regions, and switching devices electrically connected to the picture element electrodes;
the second substrate includes a counter electrode opposing the picture element electrodes with the liquid crystal layer interposed therebetween;
in each of a plurality of the picture element regions, the picture element electrode includes a solid area including a plurality of unit solid areas; and the liquid crystal layer is in a vertical alignment when no voltage is applied between the picture element electrode and the counter electrode, and when a voltage is applied between the picture element electrode and the counter electrode, forms a liquid crystal domain taking a radially-inclined orientation in a region corresponding to each of the plurality of unit solid areas by an oblique electric field produced in the vicinity of each of the plurality of unit solid areas of the picture element electrode;

the liquid crystal display device further comprising, in each of the plurality of picture element regions, a storage capacitance connected electrically in parallel to a liquid crystal capacitance which includes the picture element electrode, the counter electrode, and the liquid crystal layer; wherein:

in each of the plurality of picture element regions, the first substrate has an area where no solid area of the picture element electrode is provided;

at least a part of the storage capacitance is located in the area of the first substrate where no solid area is provided;

wherein the switching device is a thin film transistor;

wherein the storage capacitance includes a storage capacitance line, a storage electrode opposing the storage capacitance line and electrically connected to a drain electrode of the thin film transistor, and a first insulating layer provided between the storage capacitance line and the storage electrode;

the first substrate further includes a second insulating layer for covering at least the thin film transistor and the storage electrode; and

the picture element electrode is provided on the second insulating layer.

10. (Original) The liquid crystal display device of claim 9, wherein the second insulating layer is formed of a resin material.

11. (Original) The liquid crystal display device of any one of claims 1 through 10, wherein the plurality of unit solid areas each have a shape having rotational symmetry.

12. (Previously presented) The liquid crystal display device of claim 1, wherein the plurality of unit solid areas each have a generally circular shape.

13. (Previously presented) The liquid crystal display device of claim 1, wherein the plurality of unit solid areas each have a generally rectangular shape with generally arc-shaped corners.

14. (Previously presented) The liquid crystal display device of claim 1, wherein the plurality of unit solid areas each have a shape with acute corners.

15. (Previously presented) The liquid crystal display device of claim 1, wherein the plurality of unit solid areas have substantially the same shape and substantially the same size as one another, and form at least one unit lattice arranged to have rotational symmetry.

16. (Previously presented) The liquid crystal display device of claim 1, wherein the picture element electrode further has at least one opening, and the liquid crystal layer forms a liquid crystal domain taking a radially-inclined orientation in a region corresponding to the at least one opening by the oblique electric field when a voltage is applied between the picture element electrode and the counter electrode.

17. (Original) The liquid crystal display device of claim 16, wherein the at least one opening includes a plurality of openings having substantially the same shape and substantially

the same size as one another, and at least a part of the plurality of openings forms at least one unit lattice arrange to have rotational symmetry.

18. (Original) The liquid crystal display device of claim 17, wherein each of the at least the part of the plurality of openings has a shape having rotational symmetry.

19. (Previously presented) The liquid crystal display device of claim 17, wherein each of the at least the part of the plurality of openings has a generally circular shape.

20. (Previously presented) The liquid crystal display device of claim 17, wherein in each of the plurality of picture element regions, a sum of area sizes of the plurality of openings of the picture element electrode is smaller than an area size of the solid area of the picture element electrode.

21. (Previously presented) The liquid crystal display device of claim 17, further comprising a protrusion provided in each of the plurality of openings of the picture element electrode, wherein the protrusion has the same cross-sectional shape as that of the plurality of openings in a planar direction, and a side surface of the protrusion exerts an orientation-regulating force acting upon the liquid crystal molecules in the liquid crystal layer in the same direction as an orientation-regulating direction provided by the oblique electric field.

22. (Previously presented) The liquid crystal display device of claim 1, wherein the second substrate has an orientation-regulating structure in an area corresponding to each of the

plurality of unit solid areas, the orientation-regulating structure exerting an orientation-regulating force for placing the liquid crystal molecules in the liquid crystal layer into a radially-inclined orientation at least in a state where a voltage is applied between the picture element electrode and the counter electrode.

23. (Original) The liquid crystal display device of claim 22, wherein the orientation-regulating structure is provided in an area corresponding to a central portion of each of the plurality of unit solid areas or the vicinity thereof.

24. (Previously presented) The liquid crystal display device of claim 22, wherein in the liquid crystal domain formed in correspondence with each of the plurality of unit solid areas, the orientation-regulating direction provided by the orientation-regulating structure is in conformity with the direction of the radially-inclined orientation provided by the oblique electric field.

25. (Previously presented) The liquid crystal display device of claim 22, wherein the orientation-regulating structure exerts an orientation-regulating force even in a state where no voltage is applied between the picture element electrode and the counter electrode.

26. (Previously presented) The liquid crystal display device of claim 22, wherein the orientation-regulating structure is a protrusion included in the counter substrate and protruding toward the liquid crystal layer.

27. (Previously presented) The liquid crystal display device of claim 25, wherein a part of the storage capacitance overlaps the orientation-regulating structure.

28. (Previously presented) The liquid crystal display device of claim 1, wherein the liquid crystal domain takes a spiral radially-inclined orientation.

29. (Currently amended) A liquid crystal display device, comprising:
a first substrate, a second substrate, and a liquid crystal layer provided between the first substrate and the second substrate;

the liquid crystal display device having a plurality of picture element regions;

wherein:

the first substrate includes a picture element electrode provided on the side of the liquid crystal layer, the picture element electrode being provided in each of the plurality of picture element regions, and switching devices electrically connected to the picture element electrodes;

the second substrate includes a counter electrode opposing the picture element electrode with the liquid crystal layer interposed therebetween; and

in each of the plurality of picture element regions, the picture element electrode has unit solid ~~areas~~ portions and at least one opening or slit; and the liquid crystal layer is in a vertical alignment when no voltage is applied between the picture element electrode and the counter electrode, and when a voltage is applied between the picture element electrode and the counter electrode, is orientation-regulated by an oblique electric field produced in an edge portion of the at least one opening or slit of the picture element electrode;

the liquid crystal display device further comprising, in each of the plurality of picture element regions, a storage capacitance connected electrically in parallel to a liquid crystal capacitance which includes the picture element electrode, the counter electrode, and the liquid crystal layer; wherein:

at least a part of the storage capacitance overlaps the at least one opening or slit of the picture element electrode, and wherein a storage capacitor line extends in a direction such that a central elongated portion corresponding to a central portion of at least part of the storage capacitor line is aligned in an area where no solid area is provided so that the central elongated portion of the storage capacitor line is not aligned to overlap with any significant parts of the unit solid areasportions.

30. (Original) The liquid crystal display device of claim 29, wherein the switching device is a thin film transistor.

31. (Original) The liquid crystal display device of claim 30, wherein the storage capacitance includes a storage capacitance line, a storage electrode opposing the storage capacitance line and electrically connected to a drain electrode of the thin film transistor, and a first insulating layer provided between the storage capacitance line and the storage electrode.

32. (Currently amended) A liquid crystal display device, comprising:
a first substrate, a second substrate, and a liquid crystal layer provided between the first substrate and the second substrate;

the liquid crystal display device having a plurality of picture element regions;

wherein:

the first substrate includes a picture element electrode provided on the side of the liquid crystal layer, the picture element electrode being provided in each of the plurality of picture element regions, and switching devices electrically connected to the picture element electrodes;

the second substrate includes a counter electrode opposing the picture element electrode with the liquid crystal layer interposed therebetween;

in each of the plurality of picture element regions, the picture element electrode has unit solid areas ~~portions~~ and at least one opening or slit; and the liquid crystal layer is in a vertical alignment when no voltage is applied between the picture element electrode and the counter electrode, and when a voltage is applied between the picture element electrode and the counter electrode, is orientation-regulated by an oblique electric field produced in an edge portion of the at least one opening or slit of the picture element electrode;

the liquid crystal display device further comprising, in each of the plurality of picture element regions, a storage capacitance connected electrically in parallel to a liquid crystal capacitance which includes the picture element electrode, the counter electrode, and the liquid crystal layer; wherein:

at least a part of the storage capacitance overlaps the at least one opening or slit of the picture element electrode,

wherein the switching device is a thin film transistor;

wherein the storage capacitance includes a storage capacitance line, a storage electrode opposing the storage capacitance line and electrically connected to a drain electrode of the thin film transistor, and a first insulating layer provided between the storage capacitance line and the storage electrode;

the first substrate further includes a second insulating layer for covering at least the thin film transistor and the storage electrode; and

the picture element electrode is provided on the second insulating layer.

33. (Original) The liquid crystal display device of claim 32, wherein the second insulating layer is formed of a resin material.